

ENGINEERING HERITAGE WESTERN AUSTRALIA

WESTERN AUSTRALIAN ENGINEERING ORAL HISTORY PROGRAM

Transcript of Interview with

PETER BRUECHLE

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Transcriber	Mary Macfarlan
Date of Interview	Initially 23 November 2012
Duration	2 hours 18 minutes

NOTES TO THE READER ON INTERPRETATION OF THIS TRANSCRIPT

Readers of this oral history transcript need to be aware that it is a near verbatim transcript of the words as spoken during the interview that was conducted in the form of a natural conversation between the interviewer and the person being interviewed. Some minor changes have been made to facilitate the flow of the document.

Much of what is said in such interviews relies upon the accuracy of the memory of the person being interviewed and readers should bear this in mind and judge for themselves how factually accurate the material is. The interviewer has sought to clarify or verify facts and statements made during the interview where this seemed appropriate.

The views and opinions expressed within the transcript are those of the person expressing them in the interview.

Please refer to the notes on the following page to aid interpretation of the transcript.

Note 1

The recording comprises six parts. It runs for a total of 2 hours and 18 minutes. The original recordings are in wav. format.

Note 2

Where the interviewer has used words such as ‘Yes’, ‘Right’ or ‘OK’ as an encouragement, but not as anything else then these words have not been transcribed unless they are relevant for the context.

Note 3

Some words which are not in the original recording have been inserted into the transcript in order to clarify or modify what was being said. These words are shown in the form [they would say].

Note 4

Where a sentence has a series of dots in the text such as this indicates that the speaker paused, the recording was not clear enough to transcribe accurately what was said, there was pause, or the following speaker interrupted what was being said.

Note 5

Numbered footnotes have been provided in the text in order to assist the reader.

Note 6

The interviewer is referred to as ‘Ayre’ in the transcript and to the subject speaker is referred to as ‘Bruechle’.

Track	Speaker	
01	Ayre	<p>This is an interview with Peter Bruechle who will be speaking with Doug Ayre who is working as a volunteer in the Engineering Heritage Western Australia Oral History Program. This interview will form part of an oral history archive which will be housed at Engineers Australia in West Perth and Canberra. Copies may also be lodged at the Battye Library.</p> <p>Before I begin I need to make sure you understand your rights in relation to this interview. Do you understand that you will control access to the information given during this interview by filling in the consent form?</p>
	Bruechle	Yes.
	Ayre	Do we have your permission to make a transcript of the recording?
	Bruechle	Yes.
	Ayre	Thank you. You may terminate this interview at any time.
	Bruechle	Thank you.
	Ayre	<p>This interview is taking place on Friday the 23rd of November 2012 at Wembley Downs.</p> <p>May I call you Peter?</p>
	Bruechle	Of course.
	Ayre	Thank you. I'd like to look first of all, Peter, starting at the beginning with your schooling and training. Could you tell me a little about where you went to primary school?
	Bruechle	Primary school [was] Queen's Park state school which was next door to Sister Kate's.
	Ayre	Is the school still there do you know?
	Bruechle	Yes it is.
	Ayre	And secondary school?
	Bruechle	<p>Secondary school was a bit varied. I went to; let me say, I went to Leederville Tech.</p> <p>The reason that I'm a bit hesitant about it is that the first year of secondary school was actually at Perth Tech because Leederville Tech hadn't opened then. So the first year Leederville Tech opened we went to Leederville Tech.</p>
	Ayre	Ok. Now, did you do an apprenticeship then?
	Bruechle	<p>No. At Leederville Tech I took a course in something called practical plane and solid geometry by Eric Shilbury.</p> <p>Eric Shilbury was the head of engineering at Perth Tech College and he was also the president of the Institution of Engineers, West Australian branch, at one stage and he took a bit of a shine to me</p>

and suggested I do engineering with him at Perth Tech College and I won a couple of scholarships.

Ayre How did you come to be interested in things technical and engineering in the first place?

Bruechle When I was young I wasn't interested in anything much except playing billiards but Shilbury, I think, saw some potential in me and persuaded me to go into the field. My father and my uncle were both electrical engineers and they seemed to be so bright to me that I couldn't go in to that field. I was competing with geniuses so I went into the structural civil field.

Ayre So you went to technical college. Where did you do on from Leederville Tech then?

Bruechle To Perth Tech College.

Ayre Perth?

Bruechle Yes, where the School of Engineering, as I said, was being run by Eric Shilbury.

Ayre Right, and after that?

Bruechle That's it.

Ayre That was it?

Bruechle Yes. I did an Associateship in civil engineering at Perth Tech College.

Ayre Right. And have you done any post-graduate studies?

Bruechle No.

Ayre Well, going on from that, you've obviously had a profession being involved in the profession of engineering.

Bruechle Mmm.

Ayre Did you have any memberships of institutions or associations of that kind?

Bruechle Only the Institution of Engineers. When I graduated I joined the Public Works Department architectural division designing state buildings and I was there till I was about until 1956 when I was 24.

I then went to England and I worked there for a year for what was then one of London's leading structural engineers a bloke called Felix Samuely. Felix Samuely and Eric Shilbury went to school together in Berlin. They were both Jewish and they had to get out when the Hitler thing took over.

Samuely was a very bright bloke and he had quite a following. I designed part of the structure for things like the American Embassy in Grosvenor Square but I spent most of the time there working with a bloke called Willi Frischmann who went on to greater things. He became Frischmann Pell.

Willi and I were analysing the buildings for the Brussels Exhibition

which was to be held the following year. We were analysing the buildings and designing the structures for them. At that stage of the game it was pretty far-fetched stuff. The main FBI pavilion was 64 times statically indeterminate and to handle the equations we were going to what was called the 'electronic brain' at Teddington and getting the equations solved. These days of course it's a joke; you could do it on your hand calculator but in those days it was [difficult]. We used to go down by train and spend all day punching cards and so on.

Ayre You punched cards instead of paper tape?

Bruechle Absolutely. And so I was there a year doing things that I found quite exciting.

Ayre It sounds fascinating. What prompted you to go to London in the first place?

Bruechle Oh everybody went.

Ayre I see.

Bruechle It was one of those things. I mean just about anybody with a bit of nous went to Europe and had a bit of a scan around and looked at le Corbusier's buildings and stuff like that and then worked in London if they possibly could with one of the major [consultants].

I was friends with architects and they were in London and I went and joined them there.

Ayre What year was this?

Bruechle 1956/57.

Ayre And you were aged what?

Bruechle Twenty four.

Ayre Twenty four in 1956/57. Ok.

Alright. Well going on from that you worked with Public Works Department?

Bruechle Yes I did but I took a year's leave without pay and then I came back and I got married and I went back to the Public Works.

And then about three years later, [perhaps] a bit over three years later, Shilbury wanted to take long service leave and he asked me to take over his final year design and applied mechanics classes. I was working in the government, I was working overtime on things, I was lecturing for 16 hours a week and it was taking me about thirty hours a week to prepare the sixteen hours of lectures, and when Shilbury came back in August I weighed nine stone. I was absolutely tired and I had an ulcer that burst shortly afterwards.

Ayre So you'd worked yourself to a frazzle?

Bruechle I certainly had.

Ayre I'm curious. Why did you, apart from the obvious one of having a

job and an income, why did you work for the Public Works Department?

Bruechle Oh when I was a student there were two types of students. The first type of student was the fellow that drank and played billiards and got a 50% pass and then when they graduated they joined the government. And the other type of student was the swots who got very high passes and worked all the time and when they graduated they joined the government.

There was virtually no private practice in Perth. There were a couple of engineers like Don Fraser and Leon Halpern but basically the interesting work was being done by and for the government.

Ayre So if you wanted to work in that area you worked for the government?

Bruechle You did and I must say that I thought that the architectural division of the Public Works Department was a wonderful place to work.

I admired greatly people like the principal architect Paddy Clare. My immediate boss was a bloke called Lew Harding. Lew Harding was a very imaginative and clever engineer and I learnt a hell of a lot from him and I'm pretty grateful for the grounding that that group gave me.

Also I got the opportunity to work on high school buildings and hospital buildings and things of that nature while out in the private world there wasn't much of that happening you know. It came later but it wasn't there then.

Ayre So in general terms then you got a wide range of work through working with the Public Works Department?

Bruechle Yes.

Bruechle Yes, and exciting work, and good stuff and a lot of very admirable people. There were also some people I didn't get along with but I think that it was a great training ground and I think that it's a shame that the government have privatised everything. I don't think it's been a step in the right direction personally.

Ayre So what was your role with the PWD?

Bruechle Design engineer.

Ayre Design engineer. So you were working with architects were you?

Bruechle Oh yes. Well with the architectural division. The architects were in charge but I worked with senior architects like Gordon Finn on Armadale High School and Eduard Van Mens on a wing of Parliament House and stuff like that.

It was great stuff. It really was good stuff.

Bruechle The reason I left was I was running a bit of a private practice, which you weren't allowed to do, because I had architectural friends who were looking to me to help them and some of the engineers that were in existence were sniping at me. And I thought 'oh, bugger.

I'm sick of this, I'm going to get out and give them a run for their money' And so I went and told the powers that be that I was leaving and I left. I had two or three children at the time so it was a bit of a brave thing to do.

I started in one room in the office of Brand and Ferguson in St George's Terrace and I gradually grew. In the finish [my group] took over most of the building and then we moved from that building which is now called St George's House. We moved from that building to a new building that we built with others over in South Perth.

Ayre Yes, it's quite a brave decision to go out on your own isn't it?

Bruechle Yes I didn't realize quite how brave it was. I pondered and concerned myself with it for quite a while but when I'd made the decision, when I told them I was leaving, then I stopped worrying because I thought well I can always pump petrol or deliver things or whatever. I knew I wasn't going to have my family starve or anything.

As it turns out that first year I was out on my own I averaged nine hours of work per day for every day of the year. At the end of the year I was stony broke and I was owed a lot of money because you work first and you get paid later as a consultant as you're well aware. And so I finished up [broke]. As the years went along it grew and got better and I was backed by some people. There was an architect called Eric Moyle, a great friend and he paid me for jobs that I hadn't done to keep me afloat. And people like Ken Broadhurst backed me and especially my friends Tony Brand and Gus Ferguson. I had loyal people helping me and I tried to respond by doing the right thing by them.

Ayre Yes there's a strong element of support within the engineering [and] architectural community there.

Bruechle There was. I'm not too sure it's too strong any more. I think that the whole matter of everybody being selected on the basis of price now has changed that. I don't know whether I could handle today what I did then.

Ayre So just coming back to your lecturing. Just describe for me there what sort of lecturing you did and where you did it because, clearly, it was an important part of your life at one stage.

Bruechle Yes. Well what happened was that when I came back from Europe Shilbury asked me to lecture in something called Applied Mechanics I. Pretty well every engineering student had to do it in those days - all the night school students. I was lecturing at night school a couple of nights a week to crowds of 50 people and they were all mostly older than I was. I lectured and, as I said, then when Shilbury went on leave he asked me to take over his final year classes, which was quite trying, and I did that.

And then Gordon Stephenson asked me to lecture at the School of

Architecture in Structures and I did that for about 35 years on a part-time basis.

Ayre Only 35 years?

Bruechle Yes, round about 35 years.

Ayre Gosh.

Bruechle I gave up in 1997 because I went to the Gulf the Arabian Gulf.

Ayre Well we'll come back to that if you like.

So did you ever feel that you would have preferred to have been a lecturer?

Bruechle Oh goodness gracious me no

Ayre No?

Bruechle It was always a part-time thing and I always felt that people who were doing things and knew about them should give time to academia because most academics, with all due respect, don't build things and therefore don't have the feeling [for it]. I thought that having me, who was doing things and building things and being involved in the building process, I thought that that was worthwhile for the students and I still do.

I think that if I was running the School of Architecture for instance I'd have Len Buckeridge down there, and fellows like Tony Brand and Gus Ferguson, teaching the kids the practicalities of life. It's interesting that a very big number of students have said to me 'you were our favourite lecturer'.

Now I found that very difficult to believe for two reasons. One, it was a part-time job and I wasn't devoting as much time to it as I'd like to have devoted to it. I didn't have the time. So the fact that I was highly thought of [surprised me] and two, I was doing structures which all architects hate anyway. So I found that very interesting that they thought I was pretty good.

I think it was not that I was pretty good I think that some of the other lecturers weren't that red hot and I think that they appreciated the practicalities of what I was telling them.

Ayre Yes. I have to say that, based on my experience, I would agree with you absolutely. That practical element is so valuable.

Bruechle Yes, I think so.

And I think there's even something else. When I left B, G and E and went to the Gulf and worked for Multiplex as their design manager on a major building I found out a lot of things so late in my career. I mean I was 65. I found out so many things that I wish I'd known 35 years ago, you know.

Ayre Oh yes.

Bruechle I think that all structural engineers should spent time on sites. I certainly spent a lot of time on sites checking things and I think it's

valuable that you do and that you talk to the people building things and find out what their drives are and what they want to do and why they want to do it. You learn a lot if you're careful.

I think that this present business of everybody hanging over their computer for 23 hours a day and pressing the right buttons and thinking they're clever is not right. I don't think that's the [best approach]. I think that we're losing something by that.

Ayre Some of my most valuable experiences are related to a situation where I designed or planned a project and then [had] gone and actually built it and operated it.

Bruechle Oh sure.

Ayre And you look back after that and you think 'gosh, if I'd known what I know now I'd have designed it a little differently'.

Bruechle I think we're all [human]. None of us can know everything and I think that if you're going to build things then what you've got to do is understand the process a bit better than a lot of the theoreticians do.

I also find it quite strange that contractors go to engineers and say 'wouldn't it be better if we do this' and the engineer says 'go away'. I think that what the engineer should do is say 'Can I help you. What are we going to have to do? How can we improve?'

I don't understand why people think they're so bloody clever when really they don't really know what they're doing and they try and buffalo their way through.

Ayre I suppose, in simple terms, if you can't build it [then] it's not a good design is it?

Bruechle Oh well, that's quite right and I think there's a lot of that happens.

Also I think it's quite sad that we give builders such limited time to tender on things because they cannot understand whether things are going to fit together or not in the time they're given. They're given three or four weeks, or a month, to put in a price and they've got to put it in on the quantities available to them, and so on, and so on, and so on. But what they can't tell is how easy it is to build or how hard it is to build and that makes a huge difference to them.

Ayre This might sound like a little bit of a perverse question but when you're designing something to be constructed do you plan in to it, or design in to it, the ability to demolish it later?

Bruechle That's a very good question, and I think that it's one of the things that we should be bothering about, and the answer is 'no'. We try and design to make things easy to build and [that] can be built in a sequence so that they grow quite carefully but we don't think about demolition. Now I think thatit's something I've lectured to my students about. I think we've got to do one of two things. We either should be designing for demolition or we should be designing the frame work in one way and the cladding and the mechanicals and

electricals and the communications in another way so that the frame work stays but you can re clad [and] refurbish it so that [it can be brought up to date]. I think that one of the two should be the approach taken.

We're not doing [either], we're not doing it anywhere and we're not doing it on any building. I think it's time we started to think about it because one of the things that happens now, of course, is they implode buildings and then they have to clean up the rubble. If they could pick them apart, if you could build them so that you could pick them apart - get a crane up there and pick them apart - that would be a much simpler thing.

The trouble is that that adds costs and nobody wants the prime cost to go up.

Ayre How would you enforce that sort of element in a design though?

Bruechle You could only do it viably by codes. And it can be done but then you've got, it's adding, another complication to things.

Ayre Yes of course it is. I look at many of the tall buildings that go up round the CBD today and I think 'I wonder how you'd demolish that if you had to'.

Bruechle Oh well, as I said, they'll implode them but it's going to be quite difficult to [do] you know. We did a couple of the tall buildings. One at Central Park. We were building that when 9/11 happened and people had said to me what [would] happen if a plane flew in to your building. I said 'well it'll be alright because we've got a solid concrete core'. The World Trade Centre, Yamasaki's buildings, had a clad steel core and when the plane ran [into] it just knocked fire proofing off and the whole [structure] went plop.

That wouldn't happen to Central Park or any other building in Perth

Ayre So the solid concrete core is a structural element as well as the core for lifts and services is it?

Bruechle Oh that is primarily a structural element sure and there's a bit of a story about the core in Central Park. Are you interested?

Ayre Yes I am

Bruechle We couldn't make it work. The building was then the highest in Perth it's 56 storeys or so and the architect was a fellow called Peter Wilks a bloke whom I have the utmost admiration for. [We had to make] the core stiff enough for the job. I won't bore you with some of the technical details, but to make the core stiff enough the walls were getting too thick and when the walls got too thick we were cutting [down] on area that should be used, and so on. And the architect, the chief architect, Mike Fitzhardinge was grizzling at me about this.

I went across Friday night to have a talk with Peter Wilks about it and what we were going to do and Peter said 'we'll have a beer' and I said 'no, I don't want a beer. I want to fix this'. And he said 'no,

no, we'll have a beer'. So he got a beer and then he said 'what else are you working on?', and I said 'oh, don't be silly. We've got a problem here'. And he said 'what else are you working on' and I told him 'the light towers down at the WACA', which were concrete. And he said 'why did you make them that shape?' And I told him because I put the concrete out at the extremities, and so on.

Ayre They've sort of got a concave surface haven't they?

Bruechle Yes but what's happened is the concrete's right out on the corners. Where it needs to be for stiffness.

Ayre Right. Yes.

Bruechle And he, at that stage, we were building a rectangular core with the lifts inside it which is pretty standard for that sort of thing. And anyway I went home six beers later. I said to Peter 'well, we haven't fixed it' and he said 'no'.

Anyway he rang me about seven o'clock Monday morning and he said come over. And I went over and he had come up with putting the lifts in the same shape as the lights. Instead of having the lifts going in through the core he had the lifts on the outside and we could put the concrete where we needed it.

Bloody brilliant idea and that's what's built.

Ayre Right okay. I'll just pause there. We'll keep talking Peter.

Well that's quite fascinating really. So was that a solution that was used in other buildings then on?

Bruechle It has been. But that was the first time I'd ever seen it.

Ayre Its funny isn't it how something like that just leaps out at you?

He'd slept on it over the weekend and a couple of beers had helped him probably, you know.

Bruechle Very clever man. I admire him greatly. I like that building a lot

Ayre Yes

Bruechle I think it's a very fine high rise building and due in no small part to Peter Wilks's genius. He was bloody good.

Ayre Alright.

Bruechle Can I mention my partners?

Ayre Yes of course. Yes, you feel free.

Bruechle I was very fortunate in my partners. Norm Gilchrist is, or was, an excellent engineer. He was dedicated, hard working, and he could do anything. He was just one of those people that quietly went about his business. He as a very modest man.

You know that story about Winston Churchill and whoever it was, Clement Attlee? When Attlee became the Prime Minister somebody said to Churchill 'well he is at least a modest man' and Winston said 'yes, and he has much to be modest about'. Well Norm Gilchrist

was exactly the opposite. He had much not to be modest about and he was.

Ernie Evans, I think, is as good an engineer as the state's ever produced. Dr Evans, he was brilliant and most of the bridges lately have been done by Ernie and they have been done extremely well. World leading stuff; excellent.

I was so fortunate in my partners. I really was. And the staff I had behind me all of them terrific. There wasn't a weak link anywhere. Even people who weren't that technically able they were so dedicated that they'd do anything for you. I mean, if I asked them to work until three o'clock in the morning they would. And I just think I was so lucky in the people I had round me. Different people [and I] couldn't have done what I did.

Ayre You mention the word 'lucky'. I suggest there's an element of your selection capability though.

Bruechle I wasn't that good at selecting people quite frankly. I had as many failures as successes. In all the years that I ran the business I only ever sacked one bloke and I only sacked him because the rest of the staff said you've got to get rid of him. And I felt that I'd failed by not producing something good out of him.

But I wasn't that good. What we did was we had a system whereby we rewarded financially people who succeeded and those that didn't succeed didn't get rewarded financially. And I won't bore you with the details of how we went about the selection process it was quite complex. But if people weren't performing they'd come to me and say 'where's my bonus?' and I'd say 'you didn't earn one. Matter of fact I can prove you owe me money' and they'd go away. , and they [would] leave.

Ayre So it was self selection really wasn't it?

Bruechle It was. It wasn't that I was so good at selecting because I did pick some people that I thought were going to be terrific and they turned out not to be any good. But, as I said, the way we went about it - the directors went about [it], the rewarding made it so that people who weren't performing would leave.

Ayre Alright we'll just stop there.

END OF TRACK ONE

02 Ayre So is money the major issue?

Bruechle Oh not in my opinion. I think that money's important but I never set out to make a lot of money and neither did my partners. As I said I was very lucky in that I was working with dedicated professionals who really wanted to get it right and would do anything to get it right.

We sort of had a rule. Our rule was we would do anything. We would do anything that we liked and lose money, and we would do anything that we didn't like and make money, but we wouldn't do

anything we didn't like and lose money. So we wouldn't do things that we thought were no good. And we wouldn't do them.

I don't quite know where the world's gone because early on, you know, as we got in to that stage where people were being selected on price, what we were doing was working out what our fee should be, by working out how many drawings that had to be produced and how many engineers [were needed to do the job]. It was quite a complex business; and then you'd come up with a figure and hand it in and somebody would beat you by 50%.

I've said to clients 'there's my list of activities that I think need to be undertaken, there's the list of hours of engineers and draftsmen to fulfil each of those activities, there's the rates, there's the cost. Which of the activities don't you want? [The fee is reasonable]. If you don't want activities just put a red line through them.' [They would respond] 'No we need all those.' I said 'so just put a red line through them. If you don't think the hours are right tell me why you don't think they're right. If you don't think the costs are right tell me why you think the rates are wrong. Otherwise the figure sticks.'

And of course they'd still go with whoever came in with half the price and then later on there'd be all the problems in the world and that's where I think the entire construction profession has gone mad. My own view is that we should be selecting people on merit and paying them reasonably. And merit's got a lot of sides to it but we should be paying them reasonably. I think that this present concentration on selection on price is absolutely ridiculous and it applies also not only to the profession, design professionals, but it applies also to the construction professionals.

Ayre There's an undercurrent there. Correct me if I'm wrong [but] I'm really saying that you get what you pay for.

Bruechle Oh I think you do. Sometimes you don't. Sometimes you get more than you pay for because you get dedicated professionals who will lose money to do something. As I said, we would do things we liked and lose money but basically you tend to get what you pay for and if your fees are skinned then you cannot look at alternatives. You can't then look at 'shall we do it that way' or 'shall we do it that way' or 'shall we do it that way'. You don't have the time so you pick one straight away and it mightn't be the best one. An extra 1% or 2% on the design fee is nothing in the total cost of the building but it can make a 15% or 20% difference to the cost of the building but people will not recognise that and I don't altogether blame them.

I remember about 25 or 30 years ago the Building Owners and Managers Association asked me to speak at a luncheon and I said then that - we design professionals were on percentage fees in those days - and I suggested then that builders should be selected on a different basis, on the basis of merit, and they should be paid differently. They shouldn't be at risk as they were because they

were tendering. And afterwards the design professionals in the place mowed me down and said 'We don't agree with you. We start with a blank sheet of paper and our huge intelligence and we have to produce a design. The builder gets the design so he can quantify it and therefore he can put a price on it.' And I said well I didn't think that was right and I thought it was better to pick a builder and have the builder work with the design team during the design process. And anyway they didn't agree.

But after [that] the only thing good that came out of it was a bloke called Steve Van Hall, who was then the properties officer for the AMP, came to me and he said 'Peter, these builders that are going to work for the client where do they come from?' And I said 'Steve, if we picked them differently, if we select them on a different basis and treat them differently, they won't be just looking after themselves; they'll look after the client and try and be a part of the team.' And he said 'Peter, it does not matter how often you say to a pig you are a dog, you are a dog, you are a dog, it's still a pig.'

And there was some truth in that of course.

Ayre Yes. It just brings to mind the potential conflict between the designer and a builder if something isn't right with the building.

You smile there. Is that your experience?

Bruechle Of course and what happens is that if builders put in a price it's too low they then must look for flaws in the documentation and try and get something from them. That's very sad because it puts the designers and the contractors and the subcontractors at loggerheads and we shouldn't be like that. We should [accept that] it's a team game. If you pick your football team on the basis of cheapest, you know, you're going to play centre-half-forward [and ask] 'how much do you want? I'll pay for two dollars a game'. You'd have a rotten football team and I think that we've headed that way.

The difficulty is that if you pick people on any basis other than price everybody grizzles. I know because as a project manager I've done it and when I've done it I've talked clients into it and when I've done it the buildings work [is] brilliant and everybody's been happy. Everybody's worked hard, and the buildings have been cheap, and they've all finished on time, under budget. Everything's been terrific but I get 30 bloody complaints about 'why didn't you pick us?' And I've had some really nasty letters from various people and it just [frustrates me]. You can't satisfy everybody.

Ayre No, you never will.

It seems to me you're describing what I think in modern terms is called an alliance

Bruechle Ah not quite.

Ayre Not quite?

Bruechle Alliance. It's not dissimilar but I certainly am not averse to

alliances. I think that everybody I've talked to [agreed].

I haven't done an alliance. I have picked my team personally and that's worked but not on an alliance basis; not where we were all in together, [but] we're all still separate.

But alliances I think work if you get the right team together and certainly the people I've talked to in alliances have all said 'yes, they were successful'.

Ayre That's very interesting.

Now, you talked about learning as you went along and design concepts and this sort of thing. Have you learned from any mistakes that you've made?

Bruechle Do I have to admit that?

Ayre No you don't but you could say 'yes' and we could leave it there.

Bruechle I think that if you don't learn from pretty well everything you do there's something wrong. So the answer is when my firm has made mistakes, and they made a couple, I learned from them but I didn't know how to solve the problem.

We had a case where we designed a building in Kings Park Road and it got put in a drawer and two years later it was taken out and the architects had moved the lift core. And for some reason or other and I don't know, I didn't check it personally, but for some reason or other they'd changed the design without changing the design [calculations]. And it was being built and [the floor] started to sag and that cost us a lot of heartache. So yes, it has happened to me but the only thing that I think can happen is that much [more] thorough checking procedures are necessary. In that particular instance it was put in the drawer and it looked as though it was finished and it bloody well wasn't.

Bruechle There has also been the problem in this state where we had problems with what was known as blended cement where 30 MPa concrete would in fact only get to 20 MPa. In the field it would crack and sag and there was hell to pay. Not only us but just about everybody got caught with that. The concrete companies were using blended cement without bothering to tell anybody.

Ayre What is blended cement?

Bruechle Well they were putting blast furnace slag in and what happened was - it's not a bad product, I'm not knocking it - but what happens is that it only works if you keep it wet for a month. So what was happening was the cylinders, the test cylinders, were being put in a tank [of water and]. They were going 32 MPa [but] the stuff out on the site, you'd drill a hole in it [and] take a bit out it, was going 20 MPa. It was a big problem. [When we checked] the test results were looking fine, you know. It all got sorted out in the finish.

Ayre They do don't they? Yes, and what about other people's mistakes? As a member of a profession you would have learnt something from

them as well I [expect]?

Bruechle I have. My work over the last few years has primarily been looking at things that have gone wrong and acting as an expert in telling people what should happen, and what shouldn't have happened, and what went wrong, and why it went wrong. And, yes, I've learnt quite a lot.

One of the things that I alluded to earlier was the fact that I've learnt that some of the kids I don't think have been on sites and their designs look fine but they don't recognize some of the things that can go wrong on sites. And they go wrong and then there's hell to pay.

Ayre You talked about your team and construction and working on site. I'm interested in changes in standards of safety and work practices. What's been your experience there over the years?

Bruechle My own view on that is that people should be responsible for what they do. I think that personal responsibility is the way to handle the deal and that's not what's happening.

When I was young they put the steel frame for the north-east wing of the Royal Perth Hospital up and it was a bare steel frame and somebody had to go and check the joints and make sure the bolts were all tight and I did that. I scrambled around on those RSJs and with a feeler gauge and a torsion wrench and I did that. Now if I'd fallen off I'd have killed myself but, you know what, I didn't fall off.

And I think that that's [acceptable]. In these days they'd have [me] in harnesses and connected to things and God knows what. I'm not too sure that it helps because everybody now thinks that they've got to be looked after and I think it's better for people to be self-reliant.

So I think [with] the present emphasis on safety I'm not too sure it's making things safer I think its reducing peoples' self reliance.

Ayre Yes it's certainly, to me, seems to be more about managing an employer's risk rather than safety of the individual which should lie with the individual.

Bruechle That's exactly right and I'm astounded. I mean I went to a site the other day and I was given a briefing on how to comport myself on the site by a 24 year old kid. And I thought well you know I think I know a bit about it I've been scrambling round these bloody buildings for 50 years. But now you have to have an induction briefing and things like that. I don't know that it helps. I don't. But it makes everybody feel better.

Ayre Yes. So moving on from that then, what about working conditions? They would have changed a lot in your time wouldn't they?

Bruechle Oh sure. When I started of course there was no aircon and we were drawing on paper.

Ayre [All hot and sticky?]

Bruechle Yes. Exactly.

Ayre Sticking to the table.

Bruechle In the government I did quite a lot of my structural drawing on linen. You know, with ink, and it was good fun. But when I started in my private practice it used to get pretty damned hot and we had to work and now everybody can't work unless there is air-conditioning. I think that the western world has become a pretty soft place.

When I've been to China I've been astounded at how much energy is being shown. I come back here and see lollypop men standing around smoking cigarettes at \$120,000 a year and I think this is ludicrous. We're in cloud nine here, I'm afraid. How long it will last I don't know.

Ayre Yes, well, your reference to lollypop men is a reference I think to traffic control on building sites isn't it?

Bruechle Yes.

Ayre Which makes me think of our trade unions. What's been the impact of them?

Bruechle I'm not averse to trade unions and I think that half the trouble is that management [are inadequate]. People would rather follow the trade union leader - who's often a dickhead - than the management and I reckon that's management's fault.

Now, when I read that some jerk is getting \$10,000,000 for running a bank I get a bit bad tempered about it. I don't think that anybody's worth \$10,000,000 a year and I think that what should be happening is that [people should be paid reasonably]. What a builders labourer says 'if he's getting \$10,000,000 year I've got to be worth a \$150,000' and he's right.

But they're both wrong and that's where the problem lies. I think that if I was running the world I would have it that the highest paid people in any group got paid no more than twenty times the lowest paid person. That way everybody would try and lift [themselves] and I think the present system's wrong.

I don't blame the unions. I don't like some of the things that the unions do and I think that my [perception]. I've had some brawls with them but basically I don't altogether blame them. I think that they've got some rights on their side. When a unionist goes to a major contractor's house and finds parrots that cost \$25,000 a pair, and stuff like that, of course he thinks he can buy parrots at 25 grand [and] 'I want a bloody broad screen TV, I am entitled to one'.

That's where it's all at and I think it's wrong. We here in Australia and most of the western world incidentally, not all of it but most of it, what we're doing is we managed to get people working against each other. On one side we've got the unions on the other side

we've got the management and they both fight with each other. They're on the same team and it's just bloody ridiculous what's going on.

I don't like what the unions are doing but I don't like what management's doing either.

Ayre And in other words they both need to sort themselves out?

Bruechle Of course. And they won't because greed over-rides everything else and I think that management's got to realize that the first step's got to come from them not from the unions. That's pretty political.

Ayre Yes. Well it is but it's also the voice of experience Peter. I can relate so much to what you're saying.

So we've just touched on work practices and safety standards. What's been the role of legislation then? There's been some changes there haven't there?

Bruechle Oh yes. Well what we're doing [is] codifying more and more things and I think that's not necessarily a good thing because what's happening is that when I started the bylaws were that thick now they're this thick you know.¹ And what happens is nobody knows them all anymore. You can't absorb them. We should be having basics and there should be basic decisions being taken and promulgated not just adding paper to paper.

At one stage of the game when I was working for the Public Works I went through their specifications and they were what was very, very [detailed]. You know, they covered everything in those days and I thought 'well, they say the same thing in three different ways and sometimes they [contradict]'. So I went to management and said 'what about I rewrite the concrete specification in a simpler form?' And they said 'good idea' so I rewrote the concrete specifications in a simpler form so that they were clearer and I gave it to them. You know what they did with them? They stuck them on top of the rest of it. This is the sort of thing.

Nobody wants to be responsible for taking a risk.

Ayre Alright, I think that's a good point to have a break.

END OF TRACK TWO

03 Ayre Is there a role do you think for arbitration in the process of dispute resolution?

Bruechle Of course. I think that there's a role for arbitration mediation all those alternative dispute things. The trouble is that arbitration in the early days used to involve people who were expert in a certain area; architect, engineer, structural engineer, electrical engineer, and they would arbitrate; and the contractors and the designers would appear before them and they would argue their cases and the arbitrator would make a finding which was not arguable.

¹ Indicated here that they are now much greater in volume.

Now that led to some funny things happening so that then they had to give reasons. And as we've gone along the lawyers have swamped the arbitration proceeding so that you can't go to an arbitration now without lawyers. So [with] things like the building disputes tribunal; anybody who goes there without a lawyer is not very smart. It's now become the process rather than the [outcome]. It's not a simple process any more it's a bloody expensive process. Arbitration is now so expensive that a lot of people a lot of lawyers advise their clients to go to court.

Ayre Gosh.

Bruechle Oh yes. Absolutely because it's cheaper and a disinterested judge is more likely to make a sound decision than a so-called expert. There's been some damn funny results come out of arbitrations.

I think that arbitration sounds good but its developed into another court and the people who are practicing it are quasi-lawyers. Often arbitrators; maybe I shouldn't say this but often arbitrators are people who weren't very good at their profession and therefore they've taken up this as an alternative.

Ayre You mentioned the word mediation a moment ago. Is there a role for mediation?

Bruechle Oh yes there is, and a good mediator can help a lot. And there are some good mediators. I've been involved in some mediations which I thought were pretty well run.

Ayre Ok. Thank you for that.

Well over your time, and you've mentioned drawing on paper and on linen, you will have seen some tremendous changes in technology?

Bruechle Yes.

Ayre Tell me a little about that in your field.

Bruechle I was dragging my feet a bit with technology. When AutoCAD, or when CADAM, first came out it was hugely expensive and I looked at it and it was taking longer to draw on CADAM than it was on paper. Also most of my draftsmen of course were trained on paper and they were pretty good at it. And so I was a bit negative about [it] as it is. I also thought at that stage that if as much time, effort and money had gone in to physical modelling as had gone in to computer modelling that the science of engineering would have been advanced further.

Time has proven me to be wrong but I was swayed by people like the great Antonio Gaudi, who made models of his buildings intentionally upside down and then built them up the other way in compression. So that things like the Sagrada Familia and so on and the structures of Parc Guell, all those things. Just bloody amazing structures. [They are still] amazing today and he built them early in the 20th century.

Fantastic stuff and they're finishing Sagrada Familia still today. They hoped to finish it in 1926 when it would be 100 years since Gaudi's death. He got hit by a tram².

Ayre An ignominious end for an intellect like that?

Bruechle What was even worse is that he got hit by a tram and he was a pretty scruffy bloke. He spent his entire life trying to build this Sagrada Familia, this church, this cathedral, and all his money and all his efforts went in to this thing and when he got hit by the tram no taxi driver would not pick him up because they thought he was a tramp. And so it became one of Spain's great shames you know.

Ayre Oh tragic isn't it?

Bruechle Yes.

Ayre Yes. So, there's obviously been changes in technology in the drawing side of things?

Bruechle Yes.

Ayre And you talk about CAD and that technology. Where are we at today with that?

Bruechle Oh we're very advanced now and it really is quite wonderful what can be and is being done. I think it's a huge step in the right direction.

I think the downside of it is, and it has a downside, the downside is that now because of computer technology you can do anything and because you can do anything they are doing it, and that doesn't mean it should be done.

And so there [are] things that are happening [such as] the Arena. The architect talks about the millennium puzzle. Why you design a building based on a millennium puzzle I have not the slightest idea. I don't understand that sort of thinking at all. The fact that you can do something like the Arena doesn't mean that it should be done in my humble opinion.

I think there should be - I know I'm old fashioned - but there should be a logic to what you do. There should be reasons behind every architectural and engineering decision. Not that 'I can, and I'm clever, and you watch this', but there's got to be something basic to it all.

If you look at Gothic you see there's a basis. Complicated, difficult, beautifully done, grand. There's a basis to it but I'm damned if I reckon there's a basis to the Arena I think it's a heap of rubbish.

Ayre Yes, I'm still puzzled by it I must admit.

Bruechle Oh I can't understand it. People being clever for the sake of being clever. And I think it happens again and again and again. I also

² Gaudi died in 1926 so the intention here was to predict completion by 2026 which would be 100 years after his death.

think that, although architects deny it, there are fashions in architecture. And they'd say they're not fashionable [but] they're good, or great, or whatever. And they've been led by some people who have built some of what I regard as, rather weird things.

Bruechle And Frank Gehry for instance. Everyone thinks his architecture's wonderful. I don't. I think anybody who screws up a piece of paper and throws it on the ground and says that's what we're going to do is [not applying architectural logic].

Ayre Right. So just moving on then I mean the technology of project planning would have been close to your heart?

Bruechle Yes

Ayre Has that changed over the years?

Bruechle Oh well of course it has and with the computers. What the computer's done in that area is it's made people try and quantify everything and lay things out in an order and I think that's a good thing. And yes, there's some wonderful tools around now that can be used.

I think that proper planning, proper logistical planning and so on is most important for buildings and once upon a time it wasn't really. It was 'oh, where will we put the crane?' Now people actually sit down and do it properly and I think it's most important. I also think it's important that the planners the designers worry about those things at an early stage. Currently I don't think they do and they produce some things that are almost impossible to build and I think that's silly and I don't think that's good design at all.

Ayre Yes

Bruechle

Ayre I'm sure like me as a younger man you would have been involved in critical path analysis

Bruechle Oh yeah

Ayre That used to intrigue me

Bruechle Oh yeah and of course it's gotten better and better and better

Ayre Yes. We always used to do it on sheets of paper though didn't we?

Bruechle Oh sure.

Ayre Huge sheets of paper in fact.

Bruechle Yep

Ayre And I always remember building in slack time in to my program and people used to criticize me for that but ...

Bruechle It used to happen

Ayre You might as well build it in. Yes. Alright. So work scheduling and critical path analysis has all become highly computerised now

hasn't it?

Bruechle Oh yes. And for the better. It is now pretty good.

But I'd say that what we should be doing or the designers should be doing is looking at how to build things not just drawing their shapes and so on. You can't do that you've got to work out what you're going to do while you're doing it and I don't think that they're doing that sufficiently and I don't think because a lot of them have never been near a building site that they understand what they're doing and I think that that's a big draw back and I think that often contractors take on things without understanding how they're going to do it and worry about it later.

Ayre Yes I'm sure you're right.

Alright just harking back to the design elements of it. We talked earlier about design for demolition.

Bruechle Yes

Ayre To me I often wonder whether when a structure or building is designed whether it's designed for efficient maintenance.

Bruechle Couldn't agree more.

Ayre Is that an issue?

Bruechle It is an issue but we have building maintenance systems. With high rise buildings it's primarily cleaning the bloody windows or being able to replace them or whatever and, of course, we all put machines up at the top of the building to dangle people over the side and stuff like that. But often you know I look at buildings and the way they clean them is by blokes hanging on ropes and so on.

Ayre I often think there must be a better way.

Bruechle Well there are better ways obviously but Central Park has a building maintenance machine at the top and we dangle people in buckets over the side.

Ayre Internally, within the building, is maintenance an issue in the design?

Bruechle Selection of materials is always a matter yes but, how can I put it; it depends on where you are. In Australia what happens is they put ceilings and lighting in, and floors down, and generally carpeting down before anybody moves in. In America you just get concrete box with services being shown and so you can fill it in how you feel like it. Then it's a matter of just material selection and if you want materials that aren't going to last long because fashions change and you're going to rip it out and change it again in 10 years time anyway you make those decisions.

Ayre Yes. Alright. Now, you mentioned earlier working in the Gulf but before we go to the Gulf could we just pick up when you started your own consultancy, and how that developed, and the type of work that you did?

Bruechle Okay. I started in 1961 on my own doing everything. My first employee was a bloke called Ken Luffman who came after about a year a year or and a half and I was designing fairly small buildings, houses things of that nature.

The first decent commission was the Economics School at the University of WA. The architect was Marshall Clifton and he was kind enough - and I'd been working on Hale School buildings with him and he was kind enough - to give me that job. I tried to do it properly and it was fairly successful. And then things like Hale School hall for Tony Brand and Gus Ferguson and then Gus won the Law School and I did the structure for that and it's still a fine building in my opinion.

So I started doing university buildings. I did a number of UWA buildings. And the thing just built up. As I said Norm Gilchrist was my immediate boss in the Public Works Department and we were friends. What was happening was that he was playing golf with me on Tuesday afternoons after work and we used to go out to our golf club and hit golf balls around and talk and after a while, when I was out a couple of years, I was absolutely snowed under with things I had to do and I asked Norm to join me. He was worried about the future and he had young children and so on and he said no.

Two years later, we were still playing golf, and he said 'is the offer still open?' and I said 'yes' and he said 'I'm coming'. And he did. He joined me and we became 'Bruechle and Gilchrist' and then a couple of years later, two or three years later, Ernie Evans whose brother I knew extremely well came to Western Australia. He'd been overseas working in England and in New Zealand and he was a bit of a genius. He'd won Shell scholarships and things and he got a Doctorate at Imperial College in London. He joined us and it became 'Bruechle Gilchrist and Evans' and that's what it remained. We each had strengths and I think it was a good partnership.

We didn't always agree but what we did agree was that whoever was responsible for the job had the final say. So that if the other two disagreed there'd be a discussion about it and then the decision would be taken by the person doing the job. That way we completely avoided any really vituperative nastiness at all because in the finish we knew that whoever was in charge was going to make that decision and so all we could do is put in our two bobs worth and see what sort of response we got. It worked well. We continue to be friends. We don't see a lot of each other. We've drifted apart for all sorts of reasons but I have the utmost admiration for both Norm Gilchrist and Ernie Evans I think they're both wonderful engineers and I'm privileged to have worked with them.

Ayre So how long did you operate your partnership?

Bruechle I think 1971 was when B G and E were formed³. As I said I'd started on my own in '61. 1971, B G and E were formed and Norm

³ The year 1971 was confirmed by the interviewee.

Gilchrist left in about '91 or '92. I left when I turned 65 in 1997. It was agreed that we'd leave at 65 and I think that's not a bad decision. When I left I left completely. I didn't maintain any [business] tie with them at all and I think that that's also the right decision although I went up and - what happened was that we'd looked at a high rise building then the tallest building in Europe and in the middle east a thing called Emirates Tower with Multiplex - and I came up with a different structure than the structure that had been designed by the structural engineers.

Ayre That's when you went to work in the Gulf is it?

Bruechle Yes. Well what had happened was I went up with Derek Robson who was then the managing director of Multiplex in August '97 to talk to the project managers about the building and Derek and I discussed the matter of arriving at a different structural format that would be easier and quicker to build. I worked on that for a fair while and when we'd come to conclusions as to how it should be done then B G and E did the leg work and the documentation. I went up there and it worked fairly well because there's an eight hour time difference so I'd work at night, finish something and send it to Perth. They'd get it first thing in the morning work on it and get it back to me that day virtually. It worked fairly well.

Ayre It was basically a continuous process then?

Bruechle Pretty well and the engineers in Perth would work on my ideas and, or, suggest something or whatever. The problem that I had was that the design engineers for the building weren't very happy about us changing the structure and so there was a bit of to-ing and fro-ing there. And then what happened was the Emirates Towers were part [built], our building was taller but there was a shorter one next door to it and it was won by somebody called Six Construct out of Belgium and they started about three months before us. We caught them at floor 20 and we beat them to the top and finished our building well before they did despite the fact that they were 60 or 70 metres shorter than we were.

So it proved that what we'd done was a more satisfactory way of going about things. And the bloke running it what was his name? It'll come back. A Belgian, pretty tough guy. I liked him. I said to him 'we're beating you' and he said 'yes, your engineers are better'. And I said 'that's a bit difficult for a proud Belgian?' and he said 'no, you are. You're better'. Which I thought was a big compliment to our [team].

Ayre Indeed it goes to the heart of the matter doesn't it?

Bruechle It does yes. Ivan Bruyninx was his name and it was a bit of a competition obviously but it was a friendly competition.

One of the things up in the Gulf, of course, was that we didn't have the safety regs that we've got here. And there was one accident. Somebody dropped a bolt or a nut down a lift shaft and it hit somebody on the head. But he was wearing his hard hat and it gave

him concussion but that was all.

Ayre Gosh he was lucky. Well it wasn't lucky, he was wearing his hard hat wasn't he?

Bruechle But the Indians up there. I mean, gosh, we were scrambling around out on the form-work and, you know, it was just everybody was careful.

Ayre Yes, because they knew there were no second chances?

Bruechle Absolutely. I used to go out and talk to them, go out to the welders, and talk to them and so on. They were nice people and they just wanted to get it right and they were delighted to have somebody come out and have a bit of a chat with them and tell them what a great job you're doing and so on.

I wish I'd done it 35 years earlier. I spent a lot of time when I was younger on building sites and I got to know people and I got to work with people and I like working with them.

There's a famous story about a bloke called Laurie Barrett, they were building Kewdale High School and I went out there. It was off-form concrete so I wanted all the bits of wire, you know the wire ends from the twitching of the reinforcement, they all had to be picked up and I went out there and it was a mess. So I got a couple of magnets and I went round picking these bloody things up and when I'd finished I had a couple of handfuls of it and I said to Barrett 'I want this out. You can't leave that in the form it'll rust'. And he didn't say anything. He was one of those blokes who was - his name was Barrett - and anybody who wasn't a Smith or a Jones was a ding, or a dago, or a kraut. And I was a Kraut.

He was quite an interesting bloke Laurie and he said 'yes'. Anyway the next time I went out there it was much better but I [still went] around and found quite a lot [of loose ends] and I said to him 'well, that's better but it's not good enough'. And the next time I went out there I looked, and looked, and looked, and finally I found a bit of wire jammed down in the form so I got the magnet and I pulled this thing out and it was bent into a 'PB'. He'd put it there for me.

Ayre He'd set you up for it?

Bruechle But from then on everything he did was immaculate he was a bloody good bloke and I liked him very much. Difficult man but a man dedicated to doing the right thing. Laurie Barrett. Wonderful fellow. And I think that working with these people makes a difference.

Ayre It just makes a profound impression on you doesn't it really?

Bruechle It did with me. I thought that they were - I think that they are - unsung heroes. I don't think they're highly enough thought of personally. There's some terrible creeps in the building game too incidentally.

Ayre Yes, well, I think that's goes without saying. The good people often don't get recognised.

Bruechle They don't get recognised enough in my opinion.

Ayre Did you do any more work in the Gulf or overseas?

Bruechle Yes what happened was that after that Multiplex decided to tender on the building next door called 'The Tower'.

It was designed by Lebanese engineers Khatib and Alemi and we wanted to change the structure and, oh God, did I have some trouble with those buggers. They didn't want to know and a bloke called Zachy Marashli, a very difficult man, and it got to the stage where it was daggers drawn we'd won the tender on the basis of a redesign and these buggers were being impossible and they didn't want to change anything. I suggested to Derek that I go to Lebanon and talk to Ibrahim Khatib who was supposed to be a pretty good bloke and Derek said 'well, we'll get him over here'.

So we brought Ibrahim Khatib over and I showed him what we were doing, why we were doing it, how we were doing it, and why we'd changed their designs, and how it was better and so on. And he did, he turned out to be a first class bloke. And he said 'okay, go ahead'. That didn't impress Zachy Marashli, his offsider, much but we went ahead. We built that building at a floor every three days. From start to finish.

It was a 55 storey building and we built it a floor every three days it went up like that. You've got no idea. And I thought 'I've changed the world. Everybody's going to do it this way from now on'. No. They're still doing it the same old way and I don't understand why. It was cheap, it was quick, and it worked; but there's a lot of inertia in the construction industry. Every time I've come up with an idea everybody said 'oh that costs too much' and in a kind of way they're right because the first one of anything always tends to cost more

Ayre Yes it's the 100 that follow that save the money though isn't it?

Bruechle Absolutely. The third one always is the cheap one.

Ayre Yes. So any further projects overseas?

Bruechle Well after that the people who were the project managers were somebody called Turner Steiner out of America. They were people who were well [regarded]. The bloke in charge was Tony [Gordon], whatever his name was, and he was a West Indian and his offsider was a bloke called Seshardri who was Indian. I had my fights with them of course because I was trying to look after Multiplex's interests and they weren't. But I got along pretty well with Tony and Sesha and when they were asked to look into a city within a city called 'Festival City' they asked me if I would become involved and I did and as structural advisor.

What I did was I was going to..... I went to San Francisco a couple

of times, where the architect was John Jerde Partnership, and to the Gulf three or four times where we had meetings, and it was a very big deal. We were going to have a boulevard that was the same width and better than the Champs Elysees and we were going to have canals with gondolas on it and it was really absolutely 'top of the wazza' stuff. It was pretty interesting but it didn't get anywhere in the finish and John Jerde and Partnership [were sidelined]

It was interesting because one of the things that I did was [take people up the Emirates Tower] that we built. It had a spire on it and I used to take people up to the top of it. It was really quite exciting.

Ayre Top of the spire?

Bruechle Yes.

Ayre Gosh.

Bruechle There was ladders up inside [the spire] and we used to go up there. I took my 11 year old son up there and there's some photographs of it around. I thought it was pretty good stuff and the building was 360 odd metres tall or something and, no, it was really good stuff.

So I enjoyed working up there and I enjoyed the different milieu

Ayre Yes. As an electrical engineer I don't know a lot about structural design but it always seems to me that one of the things you're really watching out for is windage?

Bruechle Oh sure.

Ayre How is that a factor in modern buildings because they seem so lightweight to me - to my untrained eye anyway.

Bruechle Yes, well it is most important and it's not just strength there's also movement and there's got to be limitation on movement. Now with the use of computers we can now do some analyses that give us a fair idea.

With Central Park we had the core but the core wasn't stiff enough to stop it rocking around. So what we did was on the top of the core we put struts, or ties down to trusses, and tied it down to the outside columns so that what happens is that the core has got like a cross-tree on a mast and but it's right up at the top and what happens is that if the core's like that then it moves like that.⁴

Ayre Yes, deflects in other words.

Bruechle If we did this - when we did this - and put ties [in] then what happens is it did that. And it made it a hell of a lot stiffer.

Ayre Yes, so it sort of 'snakes' in other words?

Bruechle Yes, well [the bracing] just makes it a hell of a lot stiffer. It does not get anywhere near the movement.

Ayre Yes.

⁴ Illustrated by a hand-drawn sketch indicating the sideways flexing at the top of the building.

Bruechle So that was the sort of thing that we [did].

Now Central Park when we did Central Park the - I was lucky to get Central Park.

If you want me to tell you the story of how I got it I will.

Bruechle

Ayre Well I'll tell you what, what I'd like to do is just pause here and set up another memory chip and then we can continue with that.

Bruechle Okay.

Ayre Just while we're on the story of stiffeners I was looking at that new BHP Billiton building the other day and looking at the structure on the top and thinking that has to have some sort of stiffening stability.

Bruechle That's useless, that thing.

Ayre Is it. Oh gosh.

Bruechle Yes, the Tiara. The stiffness on BHP, you look at the sides of the building and there's trusses, K-braced trusses, and they cantilever out of the ground.

Ayre Alright, well, we'll just stop there and then we'll change over.

END OF TRACK THREE

04 Ayre Now I'd like to just pick up Peter on how you came to be involved with Central Park project.

Bruechle Thank you. One of the difficulties with consulting always is that it's hard to take the next step. It's very difficult always to get the next big job when you've not done one. And because I hadn't done a high rise building I couldn't get one and because I couldn't get one I hadn't done one. It is one of the banes of consulting that people look for your background on something and if you don't have it they won't give it to you.

And what had happened was that I was at a seminar on contract law in Sydney and the lawyers had talked about cast-iron contracts for a couple of days and at the end of the couple of days I stood up and said - I'm not good at public speaking - but I stood up and said - 'don't you think that rather than trying to write contracts that are going to bind everybody to a certain performance that what we should be doing is trying to arrive at systems whereby people want to work together, and work together to get a better result, and are happy to work together?' And I got told that I was talking Utopian nonsense and that, you know, that that didn't work by the lawyers.

And the bloke sitting next to me said 'you sound as though you've got a point of view' and I said 'yes I have' and he said 'want to talk about it?' and I said 'sure'. So we went out in to the bar at the Regent Hotel and had a beer and we talked about it much as I've talked to you about it earlier. And he said 'have you written anything?' and I said 'yes' and he said 'could I have a copy?' and I

said 'sure. If my client that I've written the thing for will let you have it I'm happy to give it to you. Give us your card'.

And he gave me his card and his name was Len Brush. He was then running the State Super Board here.

Ayre Yes that's a familiar name

Bruechle And Len got in to trouble later but I liked him I think he's a good bloke. I then sent him [a copy]. I talked to the people I'd written the paper for and they said 'by all means' and I sent him the paper. And he rang me one day and said 'come up and talk about it about the David Jones site'. I did and to cut a long story short I finished [up] getting the job which was then the biggest building in Western Australia.

And I was eternally grateful, obviously, and I said to the people around me 'We are going to have to make something special here. They've trusted us now we're going to have to do it as well as we can'.

And I had some pretty talented people around me and we came up with ideas that hadn't been used before and all sorts of ways driven partially by Peter Wilks the architect but, you know, it was terrific. The whole thing and the building I think is a credit to everybody that's been involved in it including Multiplex who built the thing. It won all the awards in its year. I mean, you know, just won every bloody award that it was in and it's a pretty good building still and that was the late eighties so you know it sort of

Ayre Well it's stood the test of time so far hasn't it?

Bruechle It certainly has. And I think it's a good building. I'm a bit biased of course having done the structure for it but I think it's a good building and I think that what that did was then it led onto Exchange Plaza and, once again, we were able to come up with a structure that was simple to build and that worked rather well.

The only trouble with that was we were building it at a floor every four days and guess who stopped it? The unions. They were going too quick and so it was a bit of a shame.

But then that's what led us in to going up to the Gulf with the same philosophies and redesigning Emirates Tower and then the tower next door to it. And as I said I thought I'd changed the world but they're not doing it.

Ayre The world didn't change?

Bruechle No. We were prefabbing most of it off site.

Ayre Yes?

Bruechle Yep.

Ayre Okay. Have you done any structural design for industrial buildings factories or oil rigs or whatever

Bruechle A hell of a lot of industrial buildings yes. As a matter of fact the original the so-called rigid frames the first RSJ things. I did the structures for many oh 1958 or something like that. What happened was Lew Harding, I went and said to him 'building trusses is silly. [Let's] do this' and he said 'ok, we'll have a go at that' and I designed them. *(Interruption due to phone ringing)*

Bruechle Where was I?

Ayre Where were we? We're talking about RSJs and....

Bruechle Oh rigid frames.

Ayre Rigid frames.

Bruechle And then I designed the structure for something called Gibbs Bright which was quite a big frame at the time. The architect was Gus Ferguson and then it started to take over and now everybody does it all the time, you know, it's just one of those things. I pioneered that.

Gus Ferguson pioneered off-form concrete in Australia with Hale School hall, and then later on the Law School, and then later on the Guild Building at the university, and the sports centre, and so on, you know. And I was involved heavily with him on those things.

Ayre Please explain to me what off-form concrete is.

Bruechle What happened was that instead of having concrete that was then plastered, or rendered or something, what was done was that good quality form work was made and the concrete was poured in to it and the board markings were left on it.

Ayre Ah, so you see these timber type finishes?

Bruechle That's right.

Ayre I understand.

Bruechle Ok?

Ayre Yes. Ok.

Bruechle So it was off-the-form instead of being plastered or rendered and I think the Law School won a Bronze medal and the Law School is still a mighty fine building. And I've talked to a lot of lawyers that trained there and they all think it's a terrific building. Gus Ferguson's a very talented bloke.

Ayre I suppose the design engineer's constrained by the materials that they have available? You mentioned RSJs I think in the 1950s. There would have been quite a few changes I suspect?

Bruechle Oh sure. But there still is. I mean with the Emirates Tower we were using sections out of Belgium that weighed a ton a bloody metre. They were huge. And they were very heavy. They were 'H' sections. They were this square and that thick you know.

Ayre Gosh as you say you're what looking at 18 inches?

- Bruechle Well 15 inches.
- Ayre 15 inches.
- Bruechle And about three inches thick flanges and webs. And so what it meant was that columns could be much smaller, made much smaller, and so on.
- Ayre Yes.
- Bruechle One of the interesting things about Central Park, that might interest you anyway, is that we were concerned about long-term movements. What happens is that the core of a building is only subject to high stress when the wind's blowing at its maximum. The rest of the time the stress in it is fairly low. Whereas the columns that are around it are subject to high stresses all the time. So what happens is that with time they creep and shrink and you get the floors coming out of level. Now you've got to make allowances for this.
- At the time there was no background on how we did this but there was a bloke called Mark Fintel who'd developed - with a bloke called Fazlur Khan from Skidmore, Owens and Merrill - developed a computer system to deal with it, long-term differential movements, and we contacted him and asked 'would you be prepared to use your expertise to solve our problem for us?'. And he said 'yes for \$25,000 which wasn't all that much. And so I sent him a brief of what our problems were and drawings and so on and Mark then ran it through his computer. Now everybody's got it but in those days it was a bit scarce. So I got to know Mark Fintel and he's a great bloke. I liked him very much. He was an interesting man he's Jewish and his best friend was Fazlur Khan. Kahn, of course, was a Muslim and they were great.
- I didn't meet Fazlur Khan. He was a famous engineer with Skidmore, Owens and Merrill and did a lot of high rise buildings. I didn't meet him but Mark I thought very highly of indeed. And he came to Perth and we spent some time with him it was good.
- Ayre Well as I've mentioned I'm an electrical engineer but I look at these buildings and think what about the foundations. Who designs them?
- Bruechle [With] most of the big buildings in Perth [up to] a thirty storey building you can get away with a foundation that is just a pad footing
- Ayre Really?
- Bruechle Oh yes, so that AMP and the aluminium [clad] building on the [St Georges Terrace] You know which one?⁵
- Ayre I can see it in mind's eye, yes.
- Bruechle They're all on pads but when it got taller like what was the R & I tower and Central Park you couldn't do that so we had to go to

⁵ This reference is to the Allendale Square building.

piles. And the piles under Central Park, there are 88 piles, something like that.

And what we did was; I don't know what you know about the ground there but the ground is interbedded clays and sands and it's full of water.

Ayre Right. Is fairly wet I think.

Bruechle And what we were doing was driving a shaft, a steel shaft, down and with a auger - [the piling contractor was] Vibropile - driving it down to what's called the Kings Park shale which is a sandstone and then drilling into the sandstone. We were going down every one of the piles and checking that it was all sound [at the base and] that there was no problems. The first one they drilled I went down.

Ayre You went down the hole?

Bruechle Yes.

Bruechle On a bosun's chair.

Ayre How far were you going?

Bruechle About 27 or 28 metres.

Ayre Be a little bit scary?

Bruechle I'm not frightened of heights and things and I was always pretty good with those. But we had a lady engineer who was going down those and she come up sopping wet and she'd stopped the whole site [with her] wet clinging dresses.

Ayre Poor lady.

Bruechle I think she enjoyed it.

Ayre Ah well, we won't go there.

Bruechle No, we'd better not.

Ayre So you bored down to this Kings Park shale?

Bruechle Yes.

Ayre And where did the pile fit in to this? Was it driven down through the bore?

Bruechle No, no. There was a shell put down and then we drilled down in to the Kings Park shale so there'd be a socketing length. So that with end bearing and side friction there was enough capability in the pile.

So that [not all piles required] the same amount of drilling in because it depended on where they were and what they were carrying. After they were drilled in we'd lower reinforcing cages [into the steel shafts] and then we'd start pouring concrete into them through a tremie from the bottom. And as the concrete went in the steel shell would come out because the steel shell was a 50 mm thick you wouldn't chuck that away every time. And so you finish up with this [reinforced concrete] pile.

And [the concrete being placed before the steel was withdrawn] would force the water out and [leave a well-cured concrete pile].

Ayre So the shell came out and reinforced concrete remained?

Bruechle Yes and that'd be used again.

Ayre Ok. Interesting.

Bruechle And they, of course, not only took compression loads they also took tension loads if there was [any] when the wind blew. [In some cases such piles could theoretically] go under tension [but] they wouldn't really because the [gravity] load was [still carried] and [still resulted in] compression.

The stability of the thing was all looked at.

Ayre My engineering training tells me, or reminds me, that concrete was strong in compression and weak in bending.

Bruechle That's why we put reinforcing cages in.

Ayre Exactly. So when you see a tall building how many floors are there below ground typically relating to the height?

Bruechle Well in Central Park there's about four⁶.

Ayre Right.

Bruechle And what happened there was that we were building under Hay Street and we only had a very limited time in which Hay Street could be half closed. And anyway all the shopkeepers were getting bad tempered.

And so what we did was we put a diaphragm wall down under bentonite and ground-anchored it and then we put a lid on it. We took piles down where there are now columns [which are] in fact piles. We put them down so that we did as much as we could at ground level then we put pre-cast concrete units on [to the piles] and then poured concrete on the pre-cast concrete units so that they [formed a deck supporting Hay Street]. [You can still see the pre-cast units]. Go and have a look at them in the car park [some time. They look like inverted tubs.]

Ayre I will.

Bruechle And we poured concrete on to [the pre-cast units to tie the deck] together. We pre-stressed [the beams between the pre-cast units] and then we put the dirt back on top and put Hay Street back.

So it was all there but then we had to dig out underneath [the deck] and start putting floors in.

Now one of the things that happened there was that when the unions found out we were pre-casting all of the floors in the building they got a bit bad tempered about it and what Multiplex agreed to do was make all the floors in the car park in-situ so that their [union

⁶ Corrected later to three.

members] would be employed.

Ayre So they were cast on site?

Bruechle Yes, so they were cast on site.

Ayre How do you keep the water out?

Bruechle The diaphragm walls keep the water out but on the ground we put down a water-proofing membrane onto a blinding layer and then we put the slab on top of [the waterproof membrane]. We [designed] the slab [to be tied] down because [it] was trying to float.

It had to be tied down to the columns [and] it had to be designed to take the pressure uplift.

Ayre So you effectively anchored it I suppose

Bruechle Yes.

Ayre Oh interesting yes. I suppose you worried about it floating it but once you've got the building on top then.....

Bruechle No, no, no. The floor would still try and float.

Ayre Would it? Oh, the floor itself would try and [float]?

Bruechle Yes. So we had to anchor it to the columns.

Ayre I understand.

Bruechle It a hell of a lot of effort went in to the building and I remember when we entered it in various competitions [we were given several awards.] [We received] a special award. Here in this state. I remember that the judges said that it bristled with innovation.

[We certainly tried hard]. We didn't accept anything, every time we started to do something we'd think 'is there another way of doing it?' Is there a better way of doing it?

And it was [a case of] everybody was trying to get it absolutely right all the time. Because Multiplex had already given a guaranteed maximum price they were involved. So that we just had a [good] team working on it. It was just terrific.

Ayre It reminds me of the old saying that there's two approaches to success. There's solving a problem and there's solving the right problem?

Bruechle Yes.

Ayre You know, and it seems to me, that if you go back to basics and question what you're doing then you're actually solving the right problems.

Bruechle Well you can. I [believe] one of the things that I mentioned earlier. I think that innovation in construction is very difficult because the first one for all sorts of reasons is always dearer.

And that's [been the history every time I have attempted to innovate]. When I did the first rigid [steel] frames they cost more

than trusses. Now [they are nearly universal] because they're [normally] cheaper, but that's the sort of thing that happens because everybody's frightened by new things.

And you've got to have some brave people around. When I told Derek Robson I wanted to prefabricate the structure for Central Park he said 'you're bloody mad'. After a while [during which we] we kept discussing it and [showing that the floor-to-floor cycle could be reduced by a couple of days] he said, because he was in charge - it wasn't me - I could only make suggestions, he said 'yes, we're going to do it'.

So I'm very grateful to Derek for all the help that he's given me over the years.

Ayre As a structural engineer you must look at some of the commercial buildings that are going up these days that are all prefabricated slabs?

Bruechle Yep.

Ayre How do you feel about them?

Bruechle Tilt-up?

Ayre Yes, tilt-up.

Bruechle I think that tilt-up is pretty reasonable I've done some. I think that there's been some problems and I don't know if you know but there was a death out in Myaree.

Ayre I remember it vaguely, yes.

Bruechle Yes, well I got involved because I was asked to look in to the matter.

I think that there are some shortcomings with tilt-up that should be addressed. I don't think that there's enough safety in them personally and I think that some of the designs [do not take safety during erection into account]. I'm surprised there hasn't been more trouble.

Ayre I mean one of the things that crosses my mind when you look at a building, and tilt-ups are no different is whether they're earthquake resistant.

Bruechle Mmm.

Ayre And you sometimes wonder when you see some of these buildings.

Bruechle I think you're right and we haven't had a shake since '69 Meckering and I think that we might have some problems if we have another Meckering.

Ayre Yes. A good engineering principal is you plan for the worst and hope for the best don't you?

Bruechle Oh absolutely.

Ayre But you always plan for the worst don't you?

Bruechle Yep. I think that some of the things I've seen I don't agree with at all but what can you do? I mean it's no good and I've been involved several times where I think that something really bad's happened but there's not a thing you can do about it. And you just sit there and wonder how the hell it happened and if it's all going to be okay and it is. It stands up but it only stands up until something goes wrong and then the problems start.

One thing about engineering is, I think, there's no gambling [or] there shouldn't be any gambling associated with it.

Ayre Well it's fundamentally a conservative enterprise isn't it?

Bruechle It's got to be. You've got to have load factors and that's all there is to it. Now I don't think that that happens all the time. And because people get away with things they think they've got it right whereas they've got a load factor of 1.003 [the structure] still stands up.

Until something happens

Ayre Yes. I know. I have a friend in Sydney who always teases me about being an engineer and I say well I'm not a structural engineer but every time you drive over Sydney Harbour Bridge just think about it.

Bruechle Oh yeah. Yes magnificent structure.

Ayre Been there a long time

Bruechle It was 1932 [when] it was opened. It's fascinating. [The Americans] built an [arched] bridge in New York and [that] weighs about half as much as Sydney Harbour.

Ayre Really?

Bruechle For the same span. Yes.

Ayre Have you ever been involved in bridge design?

Bruechle Not me personally. We did, my partner Ernie Evans [was probably the pioneer bridge designer in Australia. When I say [I've not designed bridges it is not completely true]. I've [designed] foot bridges and all sorts of [spanning structures] but Ernie Evans did all of the [main road and rail] bridges here.

What happened was that Leightons approached me when I was riding a motor bike over in the eastern states. I [stopped to say] g'day to Wally King and Wal said 'we're going to put in a bid for the Mount Henry Bridge. Do you want to do our structures?' and I said 'sure'. And I [came to WA with that promise in my pocket].

Earlier than that [our practice] designed a couple of bridges for Alcoa and Ernie was doing them. He did a terrific job and when I came back with this Mount Henry thing I said 'we've got to come up with something special. You're our bridge man]. He went over the Germany and came back and said 'incremental launching is the thing to do'. And so we then started working on [a solution].

Ayre Incremental launching is where the structures gradually eased out over the [span]?

Bruechle Yes. You put a form work up [at one end. You then place the necessary reinforcement and prestressing in the form and pour concrete into it. When the concrete has good strength then you build another section in the static form and keep pushing it out until the deck reaches the other side.]

And so Ernie spent a lot of time and effort arriving at the right answers. [Then] Clough rang me up and said 'we're doing the Mount Henry Bridge. Do you want to do it? [I said 'we can't. We are already doing it for Leightons] and Peter Knight said 'we've got an idea' I said 'so have we'. Their idea [was good], Ernie's idea was brilliant but [they won anyway].

Ayre

END OF TRACK FOUR

05

Bruechle Okay what happened was that the architect Peter Hodge had this car park and it all had to be built in five minutes because it had to be open for Christmas. The client wanted it open for Christmas and I told him we could only do that if we prefabricated it. He said 'okay, we'll prefabricate it. What do we do?' And so we worked out a precast system for it. [An engineer with us named] Paul Santillo was the [designer] that did the [hard] work.

Bruechle [We had come up with a system] that worked and we changed his layouts [and ramping system] but Peter was anxious to comply. [At about the same time we were building] a 500 car car-park over the railway next door to the [Perth] station. [It was designed to be in-situ in prestressed concrete.] I had suggested that that [car-park] be pre-cast and the quantity surveyor told the architect and the client that I was wasting money. So it's in-situ.

It was up to floor 2 and we started designing the Pier Street car park. We opened the Pier Street car park three weeks before Christmas and the other one was at floor 4/5.

Ayre And the moral of the story is?

Bruechle Well the moral of the story is that it's not just prime cost that matters its how quickly you can do things and get returns from them and things like that. The trouble with - I'm not being nasty about quantity surveyors but the trouble with- quantity surveyors is they consider [only] prime costs. They also have another bit of a problem and that is unless they've built two or three of [some type of building] then they don't know how much it's going to cost and they've got to give an estimate.

They're not prone to giving a low estimate when a low estimate is going to cause them heartburn if they don't meet it whereas if they make it higher and it comes in lower everybody's happy. If they come in lower and it goes higher then everybody's unhappy.

Ayre

Yeah that's human nature isn't it?

- Bruechle It is I'm afraid and so I don't blame them for being conservative but it can be very difficult to get innovations through quantity surveyors.
- Ayre So, just in simple terms, to summarise if you take an overall view of a project time is money and it might cost you a little more to get it built more quickly but it's starting to earn revenue sooner.
- Bruechle Absolutely. With Central Park I had exactly the same trouble with a different quantity surveyor who said it's going to cost more. And if it hadn't been for Derek Robson saying we're going to do it anyway it wouldn't have happened. And so it was Derek that enabled us to prefabricate the thing off site and that of course saved time. We were building that at [the rate of] a floor every four days or five days and the unions [appealed to the clause on the CFMEU's contract on the site. They found safety rails that were the wrong size]. They didn't want to finish it quickly.
- Ayre This might sound like a silly question so please forgive me but how does prefabricating off site save time?
- Bruechle Because you're not waiting for things. What was happening [at Central Park] was that we stood up the steel composite of the column and some steel frame beams] and then we'd pick up precast concrete units and drop them on top so that we had a floor [on which people could safely walk].
- I can show you pictures if you like. And so we had a floor in position you could walk around on it. From that floor we'd pour the [lower level] columns.
- Ayre I understand.
- Bruechle So we could then pour the concrete in the columns and top the floor but we didn't have to top the floor [immediately. We could top it when the concrete pump was free.
- So that we were building [the structure] three floors in front of the times we were tying it together. Stuff like that.
- Ayre So [that] although you're running processes in sequence you're also running quite a few in parallel aren't you?
- Bruechle Oh absolutely, absolutely, and it just saves a hell of a lot time. See with the conventional if you [are building in-situ] concrete you put props up and [construct] form-work, then put a concrete slab on it. You've got to wait at least [a week] before you can strip it.
- Ayre Absolutely yes
- Bruechle So you've got the problem of keeping [it propped]. With precast its clear [and] you can walk around on it. It's a different scene. As I said I thought I'd changed the world but I didn't and I still don't know why.
- I thought [then and] I still think that that approach is going to change things. When it's all boiled down we prefabricate

everything [possible]. Door frames. You don't build those on site anymore.

Ayre Well, we do don't we?

Bruechle Yes, absolutely, and I can't quite figure out why it hasn't taken off.

I remember when I was asked to speak at an architects' seminar in 1970 something. I said then that I thought the prefabrication was the way of the future and the architects mowed me down. They didn't like the constrictions of precast and I said 'and of course [many of] the pre-cast concrete buildings that were [hastily being] built in Europe after the Second World War were a shambles. They were nasty buildings.

I said pre-cast concrete is not a system, pre-cast concrete is a philosophy. What you've got to do is get good designers designing in precast concrete and you'll get a good result. We've [had] lousy designers designing in pre-cast concrete and [the results have been] bloody hopeless. That was where the problem was. [Prefabrication is] a philosophy.

I think that what we need is good designers designing in precast concrete but of course most of the architects weren't interested and even the good ones like Ferguson wouldn't listen.

Bruechle He wouldn't listen at all. I tried to talk him in to it he just wouldn't he wouldn't be in it at all. I could go on. It's been difficult. As I've said innovation's very difficult. There's all sorts of inertia that won't go away and not only with the designers also with the constructors. You tell a constructor I want you to do it [a new way and they will resist]. That's why you've got to involve the [constructors] when you're [making changes] so it becomes their [property] too.

Ayre Yes they have to have some ownership don't they?

Bruechle They do.

Ayre Yes. Alright. You mentioned some bus train interchanges at Warwick and Whitford.

Bruechle Yep.

Ayre I use those regularly and I often look at them. Were there any challenges with buildings like that?

Bruechle Only that of course we were building between the freeways. And once again they're prefabricated and there was no problem. Tony Brand was the architect.

Let me tell you something I don't agree with those interchanges. If I'd been [in charge they would have been different]. They drive buses on to them. {What I suggested was that it was] a waste of bloody money having buses drive on to the station. [Park the bloody buses alongside and put travelators in for the passengers].

Ayre Certainly Whitford you can feel the building shake. The structure -

it just moves when the buses drive on

Bruechle I wouldn't be surprised. But what I said was that what we should do is built a single storey decent station with travelators down to them and park the buses on the side. [Build a couple of bridges primarily personnel bridges with travelators]. Tony wouldn't listen. What had happened was that some Canadian genius had come up with the idea of putting the buses on the top of them and everybody liked the idea except me and so I thought oh well bugger it. So we designed them to carry the buses.

Ayre Of course.

Bruechle And they're still there. But they were prefabricated because we wanted them built quickly and we wanted as little site work in the freeway there as we could possibly get.

Ayre So time was of the essence?

Bruechle It was time and it was also just not having people running around trying to build things with cranes in the middle of the damn freeway forever, you know.

Ayre Okay. Well you've had some awards for design?

Bruechle Mmm.

Ayre Forest Place comes to mind. What happened there?

Bruechle Well once again, well, it was interesting what happened there. I wrote our award entry for the state award of the ACEA and I sent it in. It didn't get anywhere. The bloke who was then [the President] of the ACEA was a bloke called Roy Hardcastle and I ran in to Roy in Forrest Place and I said g'day and we had a bit of a chat. And he said this is terrific and I said 'Oh I don't think so. It's not that good' and he said 'Yes it is. What you've done here is remarkable. You must enter it in the national awards'. And I said 'well, we entered it in the state awards and didn't get anywhere'. And he said 'oh, please enter it'. So I entered it and we won.

Ayre So that was an award for structural excellence I think. Yes?

Bruechle Yes.

Ayre It's nice isn't it to have [recognition?]

Bruechle But the things we did there once again were innovative We incrementally launched the car park over the railway [in sections] and kept the railway in business [without any disturbance].

Ayre Right s

Bruechle We pre-cast all the walkways round Forrest Place. We did all sorts of things [such as we put tension piles down to stop the basement floating] because it's in a swamp. We did all sorts of things.

Ayre And there's a car park underneath of course isn't there?

Bruechle There is a big car park under it. As a matter of fact I tried to talk them out of that. I said 'this is a waste of time having this car-park

here. They wanted it for delivery. I said what you've got to do instead of having a huge great area is to have a loading dock and transport systems to get them to where they've got to go quickly and then we'll save all this money of digging the bloody hole. I'm always trying to save money but as I said I don't get anywhere much

Ayre I couldn't agree more. I support you but it's not always that obvious is it?

Bruechle No.

Ayre Okay. And you got bronze medals [from] the RAIA?

Bruechle Oh well, yes, they're given for architecture basically but we just did the structures for them.

Ayre That was Lake Karrinyup Country Club?

Bruechle Yes, Lake Karrinyup. Hale School hall, Karrinyup Country Club the Fremantle Maritime, the Law School at UWA.

Ayre Fremantle Museum?

Bruechle It's the Fremantle Museum?

Ayre That's the old asylum?

Bruechle It's the old asylum.

Ayre Yes. That's it. Excellent.

Bruechle Precisely.

Ayre That's an excellent museum.

Bruechle And there were three or four. I can't remember them all now.

Ayre I have got a mention here for a truss timber roof in the Redemptorist Retreat house.

Bruechle Yes, well, we did quite a number of timber structures. That Redemptorist Retreat house is really quite a nice building.

Ayre I must see if I can have a look at that because I love timber roofs.

Bruechle Ah well what happened was that architect called Kierath Waldron [were commissioned for the job]. Ken Waldron's been dead for a fair while now. Kierath Waldron came to me and said 'we're doing a Redemptorist Retreat house and we want you to do the structure, it was going to have rough bricks. So I came up with some pretty simple things really. We also did a chapel at John XXIII with timber roof trusses. Bob Grieve did most of the work there but we did the Redemptorist Retreat house and then....it was quite interesting because I got invited to a retreat by a bloke called Bernie Prindiville.

Ayre Oh yes I know the name.

Bruechle You know Bernie?

Ayre Well I don't know him.

Bruechle Well if you knew him he's been dead a fair while now but Bernie was a mad catholic. I'm not but I married his niece, and she was a good catholic too and we had six kids so, you know.

Bruechle I liked Bernie. Terrific bloke and he invited me to this thing because he knew I'd been the engineer and I talked to the Redemptorist brothers and they were interested in what it was all about. I said to them 'come to my place for dinner and I'll bring the plans home' and they said yes. And they did. They came to my place for dinner one night and we had a few drinks and some dinner and I showed them the plans and told them what had happened, and why it had happened, and how it had happened. And I said to them 'you're welcome to come back any time' and they said 'oh we can't, we're not supposed to do this we're only doing this because it's a research project.

Ayre Right.

Bruechle Are you a catholic?

Ayre No I'm not but I have done a lot of work with catholic schools.

Bruechle Oh well so did I. We did John XXIII and there were others. I did quite a lot of work with the Catholics and I like the effort that they put in to things.

Ayre Oh they're good people.

Bruechle Yes they are.

Ayre Coming back to timber. From a design engineer's perspective is it a good material to work with?

Bruechle Not really.

Ayre Why is that?

Bruechle Oh because it's not reliable. It's [variable]. With Ken Waldron I did a church with laminated timber arches and you know I did [other laminated structures] and what happened was the bloody glues gave up and they started to fall apart. People who'd told me that the glues were perfect and wouldn't [give up [well]] they gave up and split and I had to spend a lot of money tying them back together and stuff like that.

Bruechle So no. Timber is not really, in my opinion, a good structural material. I think the material of our time and for some time in the future's concrete. As you pointed out it's not that good in tension so you've got to put other things in it [such as] steel perhaps although there is the possibility of prestressing with glass fibres [or other tension fibres.].

There's all sorts of things still to happen and I think that [concrete is] going to remain our main building material in the foreseeable future before it's replaced by something else. It's quite energy efficient in its manufacture. I mean it takes energy to make cement and it takes energy to dig holes in the ground and to get aggregates,

and so on. But it's still miles, miles, miles better than things like clay bricks or steel or anything else.

Ayre Mmm. And I presume it's cost effective as well?

Bruechle Very much so.

Ayre Yes. Ok.

Well, just continuing on the aspect of various awards, you received the John Connell gold medal?

Bruechle Yes.

Ayre What was that for?

Bruechle Being a good engineer. I can get the award for you if you like it's upstairs but it really was [an honour]. I was the fourth recipient. And don't ask me how it happened. Somebody must have put my name forward. In fact I think it might have been a bloke called Bruno Rinaldi. A nice fellow. Obviously a lot of people backed it and I was duly given it by John Connell one evening at the Institution of Engineers.

Bruechle It's quite an honour. As I said at the time it wasn't only me there was a whole host of people who'd contributed to that especially Norm and Ernie who were both at the award. I thanked them very much for their input.

Ayre And you received an Honorary Fellowship of the Royal Australian Institute of Architects?

Bruechle Yes. Once again I don't know why. I think it had something to do with my lecturing at the university and the fact that I had spent a lot of my time with architects. When I was a student a lot of the other engineering students were returned servicemen and I was just a kid. And the other kids were architects such as Ferguson. There was a bunch of them Jackson, [Brand, Weedon]. A whole bunch of them. I spent a fair bit of time with them which came in handy later because I learnt about Corbusier and Frank Lloyd Wright and all those architectural heroes, and Antoni Gaudi and so on. I learnt about them without trying and I learnt also how they thought, and what they were doing, and why, and all that sort of stuff and I found it very handy later to be able to talk to them about it.

I was over in Sydney dealing with a big time architect from Melbourne for Leightons and Leightons asked me to discuss what I'd suggested and I did. It was a housing [complex for a] competition they were entering in Canberra. I remember that I'd laid out what I thought should happen and [the lead architect said] 'oh yes, but we were thinking more in terms of something like Mies van der Rohe's work'. I thought 'you prick' so I said to him 'oh yes, well of course Mies's work is wonderful but aren't the details so expensive?' and Frank de Vries, Leighton's man at the end of the table, said 'we can't afford to spend any money' and I thought 'that fixes you, you twerp. Don't pull Mies van der Rohe on me'. But I

was dead lucky I knew who he was you know.

Ayre Yes, yes.

Bruechle Most engineers didn't have a clue who Mies van der Rohe was. I was lucky enough to know.

Ayre Oh well you've got to jag it sometimes.

Bruechle Oh yes you certainly do.

Ayre Yes. And the Robert Law award by the Master Builders' Association?

Bruechle Don't ask me. I don't know how that happened. I wouldn't have a clue.

Ayre Right.

Bruechle What happened was that a bloke called David Mazzuchelli said 'are you coming to the dinner?' and I said 'no' and he said 'oh you must come' and I said 'oh, why?' and he said 'I want you to' and I said 'oh bugger you'. So anyway I said to him 'okay, as long as you want me to go I'll go with you'. And I went and he fussed around after me and I thought what the hell he is doing this for. It isn't like him, you know. Lovely bloke David.

And then we sat down and they said 'the award this year goes to a man who says that he's grumpy, but there's much to be grumpy about' and I said to David 'hey that's my statement, who swiped it?' And it was me.

Ayre So David had a hidden agenda didn't he?

Bruechle Well they'd asked David to make sure I turned up at the dinner. So yes, the award, don't ask me how these things happen. I don't know

Ayre Well, it strikes me that with your lecturing and your interaction you've been very happy to share your knowledge and experience.

Bruechle Oh absolutely.

Ayre And it just strikes me that it's a classic example of what you put into your profession is what you get out of it. Is that true?

Bruechle I don't know. Let me say that I have never taken on office in the Institution of Engineers or the ACEA and the reason I haven't was because I was always too busy doing work. And it wasn't that I didn't think it was worthwhile but I had to make my mind up what I was going to spend my time doing and I decided that I'd rather work and lecture than get involved in committee work, and so with my golf club I never [got involved]. I got approached at one stage to stand for the committee and I said 'no, I don't want to'. And I don't find any sense of self importance out of being the president of things. I'd rather get it right than be seen to be important if you know what I mean?

Ayre Yes I understand. Historians occasionally say that historians write history but other people make history.

Bruechle Yes.

Ayre And engineers and people like that, very quietly making history, they're doing the job.

Bruechle Yes. I think that one of the things about history is that we have managed to make dreadfully important, and the stars of our history, people who really aren't that nice. Napoleon, the Crusades, you know they went across Europe squashing everything in sight. They weren't good things so I can't quite understand why we've [made them our icons].

Our histories are not pleasant things in my opinion. Whereas the quiet achievers you never hear from them.

Ayre Well as an oral historian one hopes that the sort of interview that we're doing today, and I do many, is going some way towards correcting that because there's a lot of people like yourself working away and their stories often don't get told.

Bruechle Doug, nobody's going to read this.

Ayre We'll see.

Bruechle Nobody's going to read this.

Ayre We'll see. In 200 years time somebody might be doing some research and they'll think 'Ahah! That man was right about that concrete.'

Bruechle Yes.

Ayre You know. Anyway I don't think you or I will be around to worry about that.

Bruechle I'm not going to be around much longer. I'm 80 and so I don't know how long I'm going to last. I don't really care too much.

Ayre Oh right. You mentioned in your document here some remedial work that you've done.

Bruechle Yes.

Ayre Particularly it seems to be on prestressed concrete. Any comments on prestressed concrete?

Bruechle I think prestressed concrete's a wonderful material properly handled.

The remedial works, the one that sticks in mind, is a prestressed concrete roof for Coca Cola up in the Philippines. What had happened was that we'd designed some prestressed concrete tanks for Asia Breweries and they were being built by Structural Systems and Coca Cola were building this bloody building over yonder designed by an Australian Engineer. And the Australian engineer is a genius; he also happens to be bloody hopeless [practically]. I think he's dead now. He designed the hull for the fastest yacht in the Sydney Hobart, a prestressed concrete yacht called Helsal. The bloke was a marvellous bloke. His name was Peter Ellen.

What had happened was that he formed this roof. He was building [a building for Coca Cola] and what he did was he poured the floor in prestressed concrete then he poured the roof on the floor and then he stressed the roof side so that it went in to waves and then he lifted it. He picked it up as a lift slab and lifted it and then he tied it. Unbelievable. But he could only do it in bits so there were gaps between these roof panels. What happened was that they were at different levels and also he had promised to deliver in a period and he didn't do it.

And so there was Coca Cola getting pretty excited about it and they saw the prestressed concrete tanks being built. They went across and a fellow called Bob Freedman was there running Structural Systems. They said to Freedman 'do you know anything about prestressed concrete?' and he said 'yes'. And they said 'come and have a look at our roof'. So he went and had a look at the roof and they said 'can you fix it?' and he said 'yes'. And they said 'how?' and he said 'I'll get somebody'. And he sent me a telex saying 'get up here quick'. And I went up there and Bob and I between us worked out what to do and how to do it and we fixed it and that's the story, you know.

Bruechle In the middle the chief engineer of Coca Cola, a bloke called Joe Aycock flew over from Atlanta to be involved and it was really quite a big deal you know. We were sitting at a table and there were some louvres there and all of a sudden somebody looked up and said he's here. And it was Peter Ellen. I charged over to the window stuck my hand through it and said 'g'day Pete' and he said he said 'I'm disappointed to see you here' and I said 'why? And he said 'oh, I didn't think you'd be against me' and I said 'Peter, I'm here to find out the truth. I'm not against anybody and I'm sure you want the truth don't you?'

And, of course, he didn't really but he said 'yes', he had no option. He was Lift Slab Australia. He did all sorts of completely wonderful things. The trouble with Peter was he didn't know when to stop and as I said to him at the time 'Peter, what you're doing here's wonderful but it should be a fifth scale model in the back lot of the university of New South Wales not a full scale thing up here in the wilds of bloody Canlubang.' It's just a silly place to put it.

Ayre So it's really about pushing the boundaries that bit too far isn't it?

Bruechle Too far yep, yep.

Ayre Which is a great shame because people have got the best of intentions haven't they?

Bruechle Oh yes. I don't want to sound negative about Peter Ellen he was wonderful and he did a lot of wonderful things and he advanced the science of prestressed concrete but the beggar would push too hard. And there were things like insufficient cover on the reinforcement and so on.

What then happened was that he'd already built something for Coca

principal in life to me.

Bruechle Yes.

Ayre That you can't expect to have authority without expecting to have some responsibility can you?

Bruechle Well you can because that's what people are doing. People are taking authorities everywhere.

Ayre No, but to be fair you can't?

Bruechle Absolutely but that's not what's happening and I think that it's got to be laid down. If you want authority for something then you take responsibility for it. Authority tends to be one of those things that people like cracking round their head like a whip, 'I'm in charge'

This is silly. What they should be thinking is 'do I want that responsibility/' and people don't do that. We've seen it in the political sphere. We've seen it everywhere where people want authority and don't want to take responsibility.

I don't agree with it. In the construction industry I think it's destructive and I think that what we must do now is make sure that everybody understands what the responsibilities they're carrying if they're going to wield the authorities.

Ayre Alright.

Bruechle Ok?

Ayre Yes.

Anything else?

Bruechle Not really. That's my favourite whinge right now. I think also that right now I'm concerned about the Perth Waterfront and what's happening but I don't think that's [appropriate]. That's politically a hot potato and I don't know that that's something to be discussed right now.

Ayre Alright. Well you're not alone.

Bruechle I can't understand why it's going on. I mean they're chopping off the main east-west route which is bloody ridiculous. Over 40,000 cars a day use the [route] and they're going to cut it. They're going to put three lanes of traffic in a tunnel that was designed for two and a lay-by lane. I think that that is going to result in all sorts of things going wrong. I don't understand, and anyway, three lanes in the tunnel. I don't care even if we get three lanes in the tunnel working what's going to happen at the west end or the [east] end? It's a shambles now. Two lanes and traffic weaving [are] manageable [but] three - no hope.

There's going to be real trouble. It is a really foolish thing. I was involved with Thiess in designing a tunnel. We ran second incidentally but I think that the tunnel, if they were serious about three lanes, it had to be designed completely differently and it had to be designed completely differently at both the east and west ends.

It's wrong the way it is and I think that there's going to be real trouble with it. I can't understand what's going on.

I don't know why Barnett is so keen on doing what he's doing. I think that the centre of the city should be moved to the centre of the city. They've got all that railway land they can. There's all sorts of dilapidated stuff in the middle of the city that could be redeveloped. I don't understand what's going on.

I think Barnett and his government want to leave their mark on the city. That's not necessarily a good thing to do. I also think that they're listening to people who believe that the motor car is sinful or nasty or something and that if you block the motor car off you're doing a good thing. And I think that that's fine except that it doesn't work and that's not going to work.

So I am concerned about it.

Ayre Okay. So, in conclusion you've mentioned a few people that you have a high regard for. Are there any people that have been significant for you in your career?

Bruechle Well I think so. I've mentioned Shilbury.

Ayre Yes

Bruechle Lew Harding. Felix Samuely and a bloke called Frank Newby who was his offsider and that I worked with and Willy Frischmann. I've mentioned my Norm Gilchrist and Ernie Evans and there were plenty of my fellow workers that I am very grateful to. John Verne's was a draftsman who worked with me and is brilliant. Peter Tidy who's still working at B G & E and is a design draftsman of the first water. Peter Can away who now runs the thing or [maybe] he's just retired as a matter of fact. Rob Johnson who runs the Perth office and is an outstanding engineer. Dawn Newman my office manager; wonderful woman couldn't have done without her. Paul Santillo.

There's been so many people that I've worked with that I thought extremely highly of. I mentioned Derek Robson from Multiplex. He backed me when a lot of people wouldn't have. Ray Knight another Multiplex bloke - terrific. There's, I think that there's, so many wonderful people in construction; the whole construction industry both the design and the practical side that I've worked with. There's also been some bloody twerps but I don't think I'll mention them by name.

Ayre Yes. We all meet them don't we?

Bruechle Unfortunately we do.

Ayre Alright, well, thank you Peter for talking to me.

Bruechle Thank you Doug.

Ayre It's been very, very interesting.

Bruechle Well you'll find it interesting. I don't think most of the world's

going to find it interesting.

Ayre Okay, well shall have to wait and see.

Bruechle We shall.

Ayre Thank you.